

PHARMACOLOGICAL REVIEW OF BAKUCHI (PSORALEA CORYLIFOLIA LINN)

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Abstract- Bakuchi (*Psoralea corylifolia* Linn) belongs to family Fabaceae commonly known as ‘Avalguja’ is a traditional medicinal plant which has been used for thousands of years in Ayurvedic system of medicine as a “Kusthaghni” (cure skin disease). In traditional medicine bakuchi is extensively used in all forms of leucoderma. It imparts vigour and vitality improves digestive power and receptive power of mind, improves the texture and complexion of skin and helps growth hair. It possesses pharmacological activities like anti-psoriatic, anti-leucodermic, anti-inflammatory, hepatoprotective, anti-helminthic effect, neuroprotective, antibacterial, anti-fungal etc. This paper gives all information regarding its various traditional uses, pharmacogenosy, phytochemical constituents and pharmacological activities to enrich our knowledge about this plant. It will surely give new direction for the researchers and pharmaceutical industries to develop a new drug.

Keywords- Bakuchi, Avalguja, Kusthaghni.

Introduction

Psoralea corylifolia Linn is one of the most important medicinal plant of Fabaceae family commonly known as bakuchi babchi, bavachi. The name *Psoralea* is taken from the Greek term *psoraleos*, that means “affected with the itch or with leprosy”. It is found almost throughout India as weed of waste place. The name bakuchi means a reputed drug or that which specifies vata^[1]. Ayurveda the ancient Indian traditional system of medicine has used this plant for prevention and treatment of various disease. It shows magical effects in skin disorders such as psoriasis, leukoderma, and leprosy^[2]. The root is useful in caries of tooth^[3]. The fruits of bakuchi better diuretic, it causes biliousness they cure leprosy skin disease and alleviate kaph and vata and they improve the complexion and promote hairs^[4].

Ayurvedic Aspect

Vernacular Names^[5]

Hindi- Babachi, Bavanchi, Bhavanj, Bukchi

Gujrati- Babchi

Marathi- Babachi, Bavachya.

Sanskrit- Aindavi, Avalguja, Bakuchi, Chanderlekha, Chanderprabha, Kushthahantri, Sashilekha, Shulotkha, Sitavari, Soma, Vejani Oriya- Bakuchi.

Tamil- Karpokarishi.

Telugu- Bavanchalu, Bhavanchi-vittulu, Bogi-vittulu, Karu-bogi.

Bengali- Bavachi

Punjabi- Babchi

Synonyms^[5]

Avalguja- Useful in skin diseases.

Bakuchi- A reputed drug or that which specifies vata.

Somaraji- Inside of the seed coat has white streaks.

Krsnaphala- The fruits are black in colour.

Soma- It has a cooling property.

Putiphala- Fruits emit unpleasant smell.

Somavalli- A plant having cooling properties.

Kalamesi- Fruits are black in colour.

Kusthaghni- Useful in skin disease.

Habitat^[6]

It is found in India mostly found in Rajasthan, Punjab and adjoining areas of Uttar Pradesh, Bengal and Maharashtra.

Rasapanchak of Bakuchi^[1]

Rasa (Taste)- *Katu* (Pungent), *Tikta* (Bitter).

Vipak-Katu (Pungent).

Veerya (Potency)- *Ushna* (Hot).

Guna (Quality)- *Laghu*, *Ruksha*.

Doshaghanata-Kaphavatashamak (Alleviates vata and kapha dosha).

Karma-Rasayana,kesya,tvachya,kushthaghna,balya.

Karma

Bhavprakash Nighantu^[2]-Hrudya,kushtaghna,keshya,rasayan,kushtha krumihar

Dhanvantari Nighantu^[7]-Kafahar,kushthar, krumihar,rasayan.

Raj Nighantu^[8]-Krumighna, kushtahar,kanduhar.

Madanpal Nighantu^[9]-Kushthahar,krumihar,rasayan,vajikaran,balya,shirorogahara.

Kaiyedeve Nighantu^[10]-Rasayan,Medhya,krumi shwas kasa pramehahar,raktapittanashak.

Classification of Bakuchi in *Nighantus*

Bhavprakash Nighantu^[2]-Haritakyadi varga

Dhanvantari Nighantu^[7]-Guduchyadi varga

Raj Nighantu^[8]-Shatavyadi varga

Madanpal Nighantu^[9]-Abhayadi varga

Kaiyedeve Nighantu^[10]-Aushadi varga

Aadarsh Nighantu^[11]-Palashadi varga

Useful parts^[1]

Seed,Seedoil.

Dose^[1]

1-3 g of the drug in powder form.

Shodhan of Bakuchi^[12]

The seeds of the drug are to be kept immersed in cow milk (gomutra) or ginger-juice (adraka swarasa) for a week.

Traditional Uses of Bakuchi^[13]

The powder from the seed extract is used to relieve the symptoms of constipation, manage parasitic intestinal infections, and improve appetite,

The leaves can be used to make medicines to manage diarrhoea and fruits are good to deal with piles and nausea.

Bakuchi seeds have been used to manage various skin diseases like leukoderma a condition of discolouration of the skin.

The extract may be used in ointments or gels for topical application.

Bakuchi can also be consumed to deal with leprosy.

Actions and properties of bakuchi^[14]

Karma

Kusthaghna, tvachya, varnya, vranasanjananan, svedajanana, keshya, romasjanana, Vranaropana. dipan panchan anulomana, yakruduttejaka, krmighna, Vajikarana, mehaghna, sothahara, kaphaghna, jvaraghna.

Roga

Abhyantara-Kustha-tvaca-vranavikara

Nadidourbalya, Agnimandya-amadosa-vibandha

Krmi-gandupada, arsa, kasa-svasa, prameha, klaihya, jirnajvara.

Bahya-Kustha-mahakustha-ksudrakustha-svitra, Khalithya, kandu,

Therapeutic uses^[14]

The root is useful in caries of tooth.

The fruit is bitter, diuretic it causes biliousness cure leprosy, skin diseases and alleviate kapha and vata and they improve the complexion and promote hair.

They relieve vomiting, asthma, difficult micturition, piles, bronchitis, inflammation, anaemia.

Seeds are excellent remedy for leukoderma, leprosy and skin diseases.

The seeds are useful as an antiseptic, antibacterial and antiemetic.

Modern Aspect

Taxonomical Classification^[15]

Kingdom-Plantae

Division-Angiospermae

Class-Dicotyledoneae

Order- Fabales

Family- Fabaceae/Leguminosae

Subfamily-Papilionaceae

Genus-Psoralea

Species- P. Corylifolia

English Name-Psoralea seed

Morphology^[16]

Bakuchi (*Psoralea corlyfolia*) is leguminous erect annual herb that grows 60-100 cm tall.

The plant branches profusely and its stem and branches are covered with white hairs.

Leaves are simple 2.5 to 7 cm long, petiolate rounded with toothed margin and both sides covered with conspicuous black glandular dots.

The seeds are surrounded by sticky oily pericarp which contain psoralein.

Chemical composition^[17]

P. Corylifolia extract contains numerous phytochemicals including flavonoids.

Psoralen and isopsoralen, isopsoralidin, corylidin triacontane and β -D-glucoside are present in the seeds.

Babchi seeds contain an essential oil (0.05%), a nonvolatile terpenoid oil, a dark brown resin (8.6%), a pigment (hydroxyflavone), a monoterpene phenol named bakuchiol, a brown fixed oil (10%), raffinose and coumarin compounds (psoralen, isopsoralen, psoralidin, isopsoralidin and corylifolin), albumin, sugar, ash 7.5% and a trace of manganese.

Psoralen and isopsoralen are considered the therapeutically active constituent of the seeds.

Pharmacognostical studies ^[18]

a) Macroscopic-Fruits, dark chocolate to almost black with pericarp adhering to the seed-coat, 3-4.5 mm long, 2-3 mm broad, ovoid-oblong or bean shaped, somewhat compressed, glabrous rounded or mucronate, closely pitted, seeds campylotropous, nonendospermous, oily and free from starch, odourless, but when chewed smell of a pungent essential oil felt, taste, bitter, unpleasant and acrid.

b) Microscopic-Transverse section of fruit shows pericarp with prominent ridges and depressions, consisting of collapsed parenchyma and large secretory glands containing oleo-resinous matter testa, an outer layer of palisade epidermis, layer of bearer cells which are much thickened in the inner tangential and basal radial walls and 2-3 layers of parenchyma, cotyledons of polyhedral parenchyma and three layers of palisade cells on the adaxial side.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent,	Appendix 2.2.2.
Total Ash	Not more than 8 per cent,	Appendix 2.2.3.
Acid-insoluble ash	Not more than 2 per cent,	Appendix 2.2.4.
Alcohol-soluble extractive	Not less than 13 per cent,	Appendix 2.2.6.
Water-soluble extractive	Not less than 11 per cent,	Appendix 2.2.7.

Pharmacological Activity

Skin conditions

Phytoconstituents obtained from *P. corylifolia* Bakuchi possesses the abilities to treat various skin ailments such as psoriasis, vitiligo, leucoderma, eczemas. The antipsoriatic activity of ethanolic seeds extract of *P. corylifolia* was evaluated with the help of mouse tail models. Seeds extract showed an antipsoriatic activity of 75.8%, as compared to standard tazarot gel activity of 87.9%. Seeds extract converted the parakeratosis (keratinization) stage, which was the most important hallmark of psoriasis to the orthokeratosis (formation of anuclear keratin layer) stage of cell and thus confirmed its antipsoriatic activity ^[19]. Extract of *P. corylifolia* seeds in hexane was formulated into a cream by using the stearic acid as a base, and utilized for the treatment of patients suffering from eczema in a clinical trial for a month. The parameters studied were exudation rate, length of the lesion, and rate of itching. The symptoms score decreased after two weeks of the application of the cream. The study concluded that *P. corylifolia* could be potentially used for the treatment of eczema ^[20]. For the assessment of antipsoriatic activity and oxidative stress biomarkers properties, the effectiveness of bakuchi essential oil loaded nanocarrier gel was evaluated with the help of mouse tail models ^[21].

Anti-Leucodermic activity

A clinical trial was carried out on the patients having vitiligo by the local application of an Ayurvedic preparation containing Bakuchi (*P. corylifolia*) as the main ingredient, along with oral administration of Gandhaka rasayana. Early cases of vitiligo showed maximum improvement within 1-10 months, whereas chronic cases having vitiligo of lip showed a poor response. Oral administration of 8-methoxypsoralen along with exposure of the patient to sunlight for 5-30 min daily for 1-7 weeks gave very encouraging results. In one study, 49 patients underwent 6 months of *Psoralea corylifolia* treatment. Of these patients, 14% were cured and another 19% regained pigmentation on at least two-thirds of the affected skin ^[22].

Antioxidant activity

The antioxidant, DNA damage protection and anti-bacterial effect of *Psoralea corylifolia* seeds. The results suggested that the seeds of *Psoralea corylifolia* have potential application in food systems as an anti-oxidant in biological systems ^[23].

Anti-dermatophytic activity

The Antidermatophytic activity of extracts from *Psoralea corylifolia* (Fabaceae) correlated with the presence of a flavonoid compound. The active compound isolated was found to be flavonoid, 4'-methoxy flavone by spectral studies. MIC of the active compound along with standard miconazole was carried out using tube dilution technique ^[24].

Antipsoriatic activity

The effect of seed extracts of *Pongamia pinnata* and *Psoralea corylifolia* seed extracts showed synergistic effects on Psoriasis. It was concluded by measuring mean thickness of epidermis and histopathological reports and anti-bacterial studies by zones of inhibition and Minimum Inhibitory Concentration when compared with the individual extracts ^[25].

Antimicrobial activity

The phytoconstituents psoralen, angelicin, bakuchicin and psoralidin obtained from the seeds were found to show antibacterial activity against gram-positive and gram-negative bacteria and among them mixtures of psoralen and angelicin showed stronger activity against gram-positive bacteria *Staphylococcus aureus* whereas psoralidin showed stronger activity against gram-negative bacteria *S. flexneri* and *S. sonnei* ^[26]. Monoterpenes such as Psoracorylifols (A-E) which were isolated from the seeds, possess inhibitory activity towards two strains (SS1 and ATCC 43504) of *Helicobacter pylori* ^[27]. Babchi (*Psoralea corylifolia* Linn) essential oil possesses antibacterial activity against multidrug-resistant bacterial strain. The problem of the development of multidrug

resistance in pathogenic bacteria can be resolved by targeting the quorum sensing controlled virulence and biofilm formation in these bacteria. The methanolic fraction of *P. corylifolia* and its constituent bakuchiol reduced the quorum sensing regulated virulence and biofilm formation in *Chromobacterium violaceum*, *Pseudomonas aeruginosa*, *Serratia marcescens* and *Aeromonas hydrophila* [28]. Methanolic seeds extract of *P. corylifolia* depict significant antifungal activity against dermatophytes *Trichophyton mentagrophytes*, *T. rubrum*, *Epidermophyton floccosum*, *Microsporum gypseum* which might be due to the presence of active metabolite 4-methoxy flavones [29]. Phenyl derivative of pyranocoumarin (PDP) extracted from petroleum ether extract of *P. corylifolia* showed potent antifungal activity against *Fusarium* species. The acetylation of the C3 hydroxyl group of trichothecene mycotoxin by the trichothecene 3-O-acetyltransferase enzyme was responsible for the self defense mechanism of *Fusarium* species [30]. PDP strongly binds with trichothecene 3-O-acetyltransferase and prevents the acetylation of C3 hydroxyl group of trichothecene resulted in the destruction of self-defense mechanism of *Fusarium* species. In addition, bavachin isolated from *P. corylifolia* showed antiviral activity and was found to be highly effective against spring viraemia of carp virus (SVCV), which is an important pathogen of cyprinids. Bavachin inhibited the early event of SVCV replication via blocking SVCV induced apoptosis and cellular morphological damage observed the anti influenza viral activity of bakuchiol by using Madin-Darby canine kidney cell and found that bakuchiol inhibited the viral infection and growth and decreased the expression of mRNA and protein in these cells [31].

Antifungal activity

The effect of petroleum ether extract of seeds of *Psoralea corylifolia* (Bakuchi) on antifungal activity on *Aspergillus flavus oryzae* and *Aspergillus tamarii*. Results indicated that the plant shows significant activity [32].

Antibacterial activity

The anti-bacterial effect of *Psoralea corylifolia* seed extracts. The aqueous and methanolic extracts of the plants was used to determine the antibacterial activity by agar well diffusion method against five species of microorganisms. The present findings suggest that the doixan extracts of seed of *Psoralea corylifolia* can be used as a novel antibacterial agent in the near future [33].

Hepatoprotective activity

The aqueous extract of seeds furnished one hepatoprotective compound, bakuchiol, together with two moderately active compounds, bakuchicin and psoralen, on tacrine-induced cytotoxicity in human liver- derived Hep G-2 cells [34].

Anthelmintic activity

The alcoholic extract of seeds of evaluated for anthelmintic activity using two-enzyme system taking rat brain as a model for *Ascaridia galli* [35].

Neuroprotective activity

It is demonstrated that *P. corylifolia* Linn seed extracts have a significant protective effect against 3-nitropropionic acid induced cytotoxicity. Thus, *P. corylifolia* Linn seed extracts may have potential applications as therapeutic agents for treating neurodegenerative disease [36]. Three new prenyl flavonoids isolated from the seed of *P. corylifolia* showed antibacterial activity against *Staphylococcus aureus* and *S. epidermidis* [37]. Another study revealed that extract of *Psoralea corylifolia* seeds were active against both Gram+ve bacteria and Gram-ve bacteria. Moreover, the present work clearly demonstrates that the presence bakuchiol has a key role for antimicrobial activity of *Psoralea corlyfolia* [38]. It is demonstrated that the methanol seed extract of *P. corylifolia* comprises of a promising antifungal activity against *M. furfur*, *C. albicans*, and *A. niger* as compared to seed oil [39]. It was found that methanol extract of leaves of *P. corylifolia* in both concentration (2% and 4%) were showing best significant result for having antimicrobial activity [40]. The methanolic, acetone and hexane extracts and isolated compound, bakuchiol (2) of *Psoralea corylifolia* were tested for antimicrobial studies against three-gram positive bacteria and showed positive results. The compound bakuchiol (2) showed an excellent antibacterial activity than its crude extract [41].

Anti-tumour/ Anti Cancerous activity

The volatile fraction (fraction I) and three other fractions (fraction II, III, IV) from methanol extract of *P. corylifolia* L. were isolated. The Fraction IV significantly inhibits the growth of cancer cells (KB, KBv200, K562 and K562/ADM) in a dose-dependent manner [42]. Administration of the extract of *Psoralea corylifolia* was found to inhibit EAC (Ehrlich-Lette ascites carcinoma) ascitic tumour growth and stimulate natural killer cell activity, antibody-dependent cellular cytotoxicity, antibody-forming cells and the antibody complement-mediated cytotoxicity during tumour development [43].

Anti-diabetic activity

The anti-diabetic and anti-oxidant potential of ethanolic extract of seeds of *Psoralea corylifolia* were investigated in streptozotocin (STZ) nicotinamide induced type 2-diabetic rats. The findings indicate that *Psoralea corylifolia* has significant anti-hyperglycemic and antioxidant activity [44].

Anti-depressant activity

The behavioral and biochemical effects of total furocoumarins from seeds of *Psoralea corylifolia* were investigated in the forced swimming test (FST) in mice in comparison with amitriptyline and fluoxetine. These results suggest that Total furanocoumarins in *Psoralea corylifolia* possesses potent antidepressant properties that are mediated via MAO (monoamine oxidase) activity, HPA axis action and oxidative stress in the FST in mice [45]. The antidepressant-like effects of psoralidin isolated from the seeds of *Psoralea Corylifolia* in the forced swimming test in mice. These results suggested that psoralidin possessed potent antidepressant-like properties that were mediated via the monoamine neurotransmitter and the hypothalamic-pituitary-adrenal (HPA) axis systems [46].

Conclusion

This analysis reveals that the plant has potent pharmacological activities. The plant was found to have auspicious Antipsoriatic, Antioxidant, Antitumor, Antifungal, Antibacterial, Antidermatophytic, Antihelmintic, Cytotoxic and Antidepressant, neuroprotective, hepatoprotective, antimicrobial activities etc. The plant is usually claimed to be useful in the treatment of various disorders such as extensive eczema, Psoriasis, Leprosy, Leucoderma etc. Babchi (*P. corlyfolia*) plant extracts content psoralen and isopsoralen which may possess antitumor, antihyperglycemic, antidepressant and antioxidant activities. Its water extract possesses antibacterial property. Additional research are needed to isolate the various phytoconstituents present to get a clear idea of the mechanism of action of the plant and utility of Bakuchi (*P. Corlyfolia*) in clinical practice.

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